REVIEWS & NOTICES

Matter → Life → Intellect, by A. I. OPARIN [in Russian]. Nauka Publishing House, Moscow, USSR: 207 pp., illustr., 20.5 X 19.3 X 1.1 cm, stiff paper covers, 90 kop., 1977.

Drawing on the latest findings of astronomy, physics, geology, chemistry, and biology, this book presents a lucid account of the state of current scientific thinking about the problem of the origin of life.

The formula Matter → Life → Intellect, which is the book's title, represents the materialistic view, of which Academician Oparin has for more than 50 years been a leading advocate, that the evolution of inorganic matter led to the emergence of organic compounds and living things, and that life in turn led to the emergence of intellect.

The introduction and first chapter give the historical background of the problem, showing how the notion of spontaneous generation and the idealistic formula Matter + Life → Intellect (according to which matter led to life not directly but through the influence of some external intellect, whether divine or originating elsewhere in space) gradually lost ground in the face of strict scientific inquiry.

In the seven remaining chapters, the Author describes the current state of knowledge about the various phases of the evolution of living things from inorganic matter—noting, where appropriate, the gaps in that knowledge.

In the first of the substantive chapters, the Author describes the formation and distribution in space of carbon compounds and heavy elements under the influence of nuclear synthesis and the processes of star formation. He also shows that inter-stellar space is constantly being enriched with carbon compounds deriving from comets and the interaction of stars with the stellar environment.

The next chapter deals with the formation and evolution, in the solar system, of the carbon compounds which were the basis for the further evolution of terrestrial organic chemistry and the eventual emergence of life. This is followed by an account of the evolution of carbon compounds in the early phases of the Earth's existence, when the planet inherited a large reserve of abiogenic organic substances—mainly non-volatile carbon compounds. At this point, we are told that the use of experimental models becomes necessary, as the presence on Earth of so many organic forms and remains makes it extremely difficult to observe the emergence of primary life-forms.

The next four chapters give a detailed account of the experimental work which has been done to simulate conditions during the early phases of the Earth's existence, before the formation of the modern biosphere; emphasis is laid on the need for further, strictly-controlled research in certain areas. These chapters deal with the evolution of organic substances, the emergence of separate open systems, the evolution of *probionts* (the Author's conventional term for the simple organic systems which preceded the most primitive life-forms) on the path to the emergence of primary organisms, and the further evolution of the metabolism and intra-cellular structure of primitive organisms.

In conclusion, the Author rejects the idea that human progress is to be sought through the biological and genetical improvement of individuals; instead, he emphasizes the value of the social form of development, an important merit of which is its extreme rapidity when compared with biological change.

With the exception of the last four chapters, which deal mainly with the use of experimental models to study the organic processes involved in the emergence of the first primitive organisms, much of this fascinating and thorough book is within the reach of most educated, non-specialist readers. As it is, however, intended for a 'wide circle of scientists' [publisher's note], one would expect to find in it a much fuller bibliography than the mere 15 titles that it contains. In the body of the text, dozens of scientific authors are named, in connection with many highly important experiments and studies; and although on page 39 we are promised that references to the works of individual authors will be found in the bibliography, this is rarely the case. Some other source material is identified in footnotes on the page where the particular author is mentioned, and not in the bibliography; but most authors and their works are not identified with the degree of detail which is customary and desirable in such publications. For a serious specialist reader, this shortcoming could detract from the value of this interesting and useful book.

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The Control of Energy, Edited by R. BRUCE LINDSAY. (Benchmark Papers on Energy, Vol. 6) Halsted Press, New York, N.Y.: xi + 404 pp., illustr., 26 X 18 X 2.8 cm, stiff paper covers, $26, 1977.

Energy and environment are inextricably linked. At one level, ecosystems are described in terms of energy-flow, and physical energy models serve to illuminate the workings of such systems. At the other end of the scale, energy production—coal, oil, nuclear, etc.—impact significantly on the human environment. It is hardly surprising, therefore, that there is a proliferation of publications in this field

The Benchmark Papers on Energy provide a solid grounding in this area, and the recent publication of 'The Control of Energy', while directed primarily at electrical and electronic engineers concerned with the historical development of control devices, does have significant interest for ecologists. In particular, it is fascinating to compare the development of energy-control mechanisms with that of energy-control in living systems as represented in the paper on physiological homeostases published by W. B. Cannon in 1920 and reproduced here.

Even more fascinating, perhaps, is the reproduction of the paper by A. M. Ampère, published originally in 1834, which introduces the word 'cybernetics' for the concept of the art of steering or governing in general. Further papers in this section elaborate on the significance of the cybernetic concept for the understanding of complex systems.

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